CLAIMS:

1. A non-volatile memory device (30) comprising an organic ambipolar semiconductor layer (19) and an organic ferroelectric layer (14), said organic ambipolar semiconductor layer (19) and said organic ferroelectric layer (14) being at least partially in contact with each other.

2. A non-volatile memory device (30) according to claim 1, furthermore comprising a control electrode (13) being formed in a first conductive layer.

3. A non-volatile memory device (30) according to claim 2, the control electrode (13) being separated from said organic ambipolar semiconductor layer (19) by said organic ferroelectric layer (14).

4. A non-volatile memory device (30) according to claim 2, furthermore comprising a first main electrode (17) and a second main electrode (18) being formed in a second conductive layer, said first (17) and said second (18) main electrode being separated from each other by material of the organic ambipolar semiconductor layer (19), and said first (17) and said second (18) main electrode being separated from said control electrode (13) by said organic ferroelectric layer (14).

5. A non-volatile memory device (30) according to claim 1 , wherein the first conductive layer is a conductive polymer layer.

6. A non-volatile memory device (30) according to claim 5, wherein the conductive polymer layer is a PEDOT/PSS layer or a PANI layer.

7. A non-volatile memory device (30) according to any of claims 1, wherein the second conductive layer is a conductive polymer layer.

8. A non-volatile memory device (30) according to claim 7, wherein the conductive polymer layer is a PEDOT/PSS layer or a PANI layer.

9. A non-volatile memory device (30) according to claim 1, wherein the organic ferroelectric layer (14) is a ferroelectric polymer or oligomer layer.

10. A non-volatile memory device (30) according to claim 9, wherein the ferroelectric polymer or oligomer layer (14) is a layer comprising material selected from: $(CH_2\text{-}CF_2)_n$, $(CHF\text{-}CF_2)_n$ $(CF_2\text{-}CF_2)_n$ or combinations thereof to form (random) copolymers like : $(CH_2\text{-}CF_2)_n\text{-}(CHF\text{-}CF_2)_m$ or $(CH_2\text{-}CF_2)_n\text{-}(CF_2\text{-}CF_2)_m$.

11. A non-volatile memory device (30) according to claim 1, wherein the organic ambipolar semiconductor layer (19) comprises a mixture of an n-type and a p-type semiconductor material.

12. A non-volatile memory device (30) according to claim11, wherein the organic ambipolar semiconductor layer (19) comprises a mixture of [6,6]-phenyl C61 butyric acid methyl ester and poly[2-methoxy,5-(3,7) dimethyl-octyloxy]-p-phenylene vinylene.

13. A non-volatile memory device (30) according to claim 1, wherein the organic ambipolar semiconductor layer (19) comprises a single organic material.

14. A non-volatile memory device (30) according to claim 13, wherein the single organic material is poly(3,9-di-tert-butylindeno[1,2-b] fluorene).

15. A non-volatile memory device (30) according to claim 1, the memory device (30) comprising a memory window, whereby said memory window depends on the ratio of electron current and hole current.

16. A non-volatile memory device (30) according to claim 1, whereby said ration of electron current and hole current is close to 0 or close to 1.

17. A method for processing a non-volatile memory device (30), the method comprising: forming an organic ferroelectric layer (14) and forming an organic ambipolar

semiconductor layer (19), said organic ambipolar semiconductor layer (19) and said organic ferroelectric layer (14) being at least partially in contact with each other.